MATHEMATICS 8 AND 9

**NUMBER**

**General Outcome**: Develop number sense.

**PRESCRIBED LEARNING OUTCOMES SUGGESTED ACHIEVEMENT INDICATORS**

*It is expected that students will:*

*The following set of indicators may be used to assess student*

*achievement for each corresponding Prescribed Learning Outcome.*

*Students who have fully met the Prescribed Learning Outcome are*

*able to:*

A1 demonstrate an understanding

of perfect square and square

root, concretely, pictorially, and

symbolically (limited to whole

numbers)

[

represent a given perfect square as a square region using

materials such as grid paper or square shapes

determine the factors of a given perfect square, and explain

why one of the factors is the square root and the others are

not

determine whether or not a given number is a perfect

square using materials and strategies such as square shapes,

grid paper, or prime factorization, and explain the reasoning

determine the square root of a given perfect square and

record it symbolically

determine the square of a given number

A2 determine the approximate

square root of numbers that are

not perfect squares (limited to

whole numbers)

estimate the square root of a given number that is not a

perfect square using the roots of perfect squares as

benchmarks

approximate the square root of a given number that is not a

perfect square using technology (e.g., calculator, computer)

explain why the square root of a number shown on a

calculator may be an approximation

identify a number with a square root that is between two

given numbers

**STUDENT ACHIEVEMENT** *Grade 8*

MATHEMATICS 8 AND 9 **63**

A3 demonstrate an understanding

of percents greater than or equal

to 0%

provide a context where a percent may be more than 100%

or between 0% and 1%

represent a given fractional percent using grid paper

represent a given percent greater than 100 using grid paper

determine the percent represented by a given shaded

region on a grid, and record it in decimal, fractional, and

percent form

express a given percent in decimal or fractional form

express a given decimal in percent or fractional form

express a given fraction in decimal or percent form

solve a given problem involving percents

solve a given problem involving combined percents (e.g.,

addition of percents, such as GST + PST)

solve a given problem that involves finding the percent of a

percent (e.g., A population increased by 10% one year and

then 15% the next year. Explain why there was not a 25%

increase in population over the two years.)

demonstrate an understanding

of ratio and rate

express a two-term ratio from a given context in the

forms 3:5 or 3 to 5

express a three-term ratio from a given context in the

forms 4:7:3 or 4 to 7 to 3

express a part to part ratio as a part to whole fraction (e.g.,

frozen juice to water; 1 can concentrate to 4 cans of water can

be represented as 1

5 , which is the ratio of concentrate to

solution, or 4

5 , which is the ratio of water to solution)

identify and describe ratios and rates from real-life

examples, and record them symbolically

express a given rate using words or symbols (e.g., 20 L per

100 km or 20 L/100 km)

express a given ratio as a percent and explain why a rate

cannot be represented as a percent

A5 solve problems that involve

rates, ratios, and proportional

reasoning

explain the meaning of

*a*

*b*

within a given context

provide a context in which

*a*

*b*

represents a:

- fraction

- rate

- ratio

- quotient

- probability

solve a given problem involving rate, ratio, or percent

**STUDENT ACHIEVEMENT** *Grade 8*

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A6 demonstrate an understanding

of multiplying and dividing

positive fractions and mixed

numbers, concretely, pictorially,

and symbolically

identify the operation required to solve a given problem

involving positive fractions

provide a context that requires the multiplying of two given

positive fractions

provide a context that requires the dividing of two given

positive fractions

estimate the product of two given positive proper fractions to

determine if the product will be closer to 0,



1

2 , or 1

estimate the quotient of two given positive fractions and

compare the estimate to whole number benchmarks

express a given positive mixed number as an improper

fraction and a given positive improper fraction as a mixed

number

model multiplication of a positive fraction by a whole

number concretely or pictorially and record the process

model multiplication of a positive fraction by a positive

fraction concretely or pictorially using an area model and

record the process

model division of a positive proper fraction by a whole

number concretely or pictorially and record the process

model division of a positive proper fraction by a positive

proper fraction pictorially and record the process

generalize and apply rules for multiplying and dividing

positive fractions, including mixed numbers

solve a given problem involving positive fractions, taking

into consideration order of operations (limited to problems

with positive solutions)

A7 demonstrate an understanding

of multiplication and division of

integers, concretely, pictorially,

and symbolically

[C, CN, PS, R, V]

identify the operation required to solve a given problem

involving integers

provide a context that requires multiplying two integers

provide a context that requires dividing two integers

model the process of multiplying two integers using

concrete materials or pictorial representations and record the

process

model the process of dividing an integer by an integer using

concrete materials or pictorial representations and record the

process

solve a given problem involving the multiplication of

integers (2-digit by 1-digit) without the use of technology

solve a given problem involving the division of integers

(2-digit by 2-digit) with the use of technology

generalize and apply a rule for determining the sign of the

product and quotient of integers

solve a given problem involving the division of integers

(2-digit by -digit) without the 1 use of technology

**STUDENT ACHIEVEMENT** *Grade 8*

MATHEMATICS 8 AND 9 **65**

**PATTERNS AND RELATIONS (PATTERNS)**

**General Outcome**: Use patterns to describe the world and solve problems.

**PRESCRIBED LEARNING OUTCOMES SUGGESTED ACHIEVEMENT INDICATORS**

*It is expected that students will:*

*The following set of indicators may be used to assess student*

*achievement for each corresponding Prescribed Learning Outcome.*

*Students who have fully met the Prescribed Learning Outcome are*

*able to:*

B1 graph and analyse two-variable

linear relations

[C, ME, PS, R, T, V]

determine the missing value in an ordered pair for a given

equation

create a table of values by substituting values for a variable

in the equation of a given linear relation

construct a graph from the equation of a given linear

relation (limited to discrete data)

describe the relationship between the variables of a given

graph

solve a given problem involving integers taking into

consideration the order of operations

**STUDENT ACHIEVEMENT** *Grade 8*

**66** MATHEMATICS 8 AND 9

**PATTERNS AND RELATIONS (VARIABLES AND EQUATIONS)**

**General Outcome**: Represent algebraic expressions in multiple ways.

**PRESCRIBED LEARNING OUTCOMES SUGGESTED ACHIEVEMENT INDICATORS**

*It is expected that students will:*

*The following set of indicators may be used to assess student*

*achievement for each corresponding Prescribed Learning Outcome.*

*Students who have fully met the Prescribed Learning Outcome are*

*able to:*

B2 model and solve problems

using linear equations of the

form

−*ax = b*

−



*xa*

*b* , *a* ≠ 0

−*ax + b = c*

−



*xa*

*b* *c* , *a* ≠ 0

−*a(x + b) = c*

concretely, pictorially, and

symbolically, where *a*, *b,* and *c*

are integers

model a given problem with a linear equation and solve the

equation using concrete models (e.g., counters, integer tiles)

verify the solution to a given linear equation using a variety

of methods, including concrete materials, diagrams, and

substitution

draw a visual representation of the steps used to solve a

given linear equation and record each step symbolically

solve a given linear equation symbolically

identify and correct an error in a given incorrect solution of a

linear equation

apply the distributive property to solve a given linear

equation (e.g., 2(*x* + 3) = 5; 2*x* + 6 = 5; …)

solve a given problem using a linear equation and record

the process

**STUDENT**

**ACHIEVEMENT** *Grade 8*

MATHEMATICS 8 AND 9 **67**

**SHAPE AND SPACE (MEASUREMENT)**

**General Outcome**: Use direct or indirect measurement to solve problems.

**PRESCRIBED LEARNING OUTCOMES SUGGESTED ACHIEVEMENT INDICATORS**

*It is expected that students will:*

*The following set of indicators may be used to assess student*

*achievement for each corresponding Prescribed Learning Outcome.*

*Students who have fully met the Prescribed Learning Outcome are*

*able to:*

C1 develop and apply the

Pythagorean theorem to

solve problems

[CN, PS, R, T, V]

model and explain the Pythagorean theorem concretely,

pictorially, or using technology

explain, using examples, that the Pythagorean theorem

applies only to right triangles

determine whether or not a given triangle is a right triangle

by applying the Pythagorean theorem

determine the measure of the third side of a right triangle,

given the measures of the other two sides, to solve a given

problem

solve a given problem that involves Pythagorean triples

(e.g., 3, 4, 5 or 5, 12, 13)

C2 draw and construct nets for

3-D objects

[C, CN, PS, V]

match a given net to the 3-D object it represents

construct a 3-D object from a given net

draw nets for a given right circular cylinder, right

rectangular prism, and right triangular prism, and verify

by constructing the 3-D objects from the nets

predict 3-D objects that can be created from a given net and

verify the prediction

C3 determine the surface area of

−right rectangular prisms

−right triangular prisms

−right cylinders

to solve problems

[C, CN, PS, R, V]

explain, using examples, the relationship between the area

of 2-D shapes and the surface area of a given 3-D object

identify all the faces of a given prism, including right

rectangular and right triangular prisms

describe and apply strategies for determining the surface

area of a given right rectangular or right triangular prism

describe and apply strategies for determining the surface

area of a given right cylinder

solve a given problem involving surface area

**STUDENT ACHIEVEMENT** *Grade 8*

**[C]** Communication

**[CN]** Connections

**[ME]** Mental Mathematics

and Estimation

**[PS]** Problem Solving

**[R]** Reasoning

**[T]** Technology

**[V]** Visualization

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C4 develop and apply formulas for

determining the volume of

right prisms and right cylinders

[C, CN, PS, R, V]

determine the volume of a given right prism, given the

area of the base

generalize and apply a rule for determining the volume of

right cylinders

explain the connection between the area of the base of a

given right 3-D object and the formula for the volume of the

object

demonstrate that the orientation of a given 3-D object does

not affect its volume

apply a formula to solve a given problem involving the volume of a right cylinder or a right prism

**STUDENT ACHIEVEMENT • *Grade 7***